United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-53
● Original
○ Amendment

Contract Number: EP-C-09-027	Contract Period Base: 04/01/2009 - 03/31/2010 Option Period No. 0	SF Site Name:

Title of Work Assignment: Measurement of Gas Phase Pollutants from Idling Aircraft

Suggested Source: Arcadis Geraghty & Miller	Specify Section & Paragraph of Contract SOW: 3.0; 4.0; 5.3; 6.0; 7.0
Purpose: ● Work Assignment Initiation ○ Work Assignment Close-Out ○ Work Assignment Amendment ○ Incremental Funding ○ Work Plan Approval	Period of Performance From: 11/23/2009 To: 03/31/2010
Comments:	QA Category (check one) ○ I Enforcement ○ II Standard Setting ● III Technology Development ○ IV Proof of Concept ○ N/A

Note: To report additional accounting and appropriations data use EPA Form 1900-69A.

SFO 22 (Max 2) ☐ Superfund ☒ Non-Superfund

Accounting and Appropriations Data

	DCN (Max 6)	Budget/FYs (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount	Sites/Project (Max 8)	Cost Org/Code (Max 7)
1									
2									
3									
4									
5									

Authorized Work Assignment Ceiling

Contract Period:	Cost/Fee	LOE
Previously Approved	New	0
This Action		1229
Total		1229

Work Plan / Cost Estimate Approvals

Contractor WP Dated:	Cost/Fee:	LOE:
Cumulative Approved:	Cost/Fee:	LOE:

Work Assignment Manager Name	John Kinsey	Branch / Mail Code	ECPB / E343-02
(Signature)	11/18/09 (Date)	Phone Number	(919) 541-4121
		Fax Number	919-541-0359
Branch Chief Name	Richard C. Shores, Chief, ECPB	Branch/Mail Code	ECPB / E343-02
(Signature)	11/18/09 (Date)	Phone Number	(919) 541-4983
		Fax Number	919-541-0359
Project Officer Name	Diane Pierce	Branch/Mail Code	/
Diane Pierce (Signature)	11/19/09 (Date)	Phone Number	(919) 541-2708
		Fax Number	919-541-0496
Contracting Official Name	Renita Tyus, CO	Branch/Mail Code	CPOD
Renita Tyus (Signature)	11/23/09 (Date)	Phone Number	(513) 487-2094
		Fax Number	(513) 487-2109

Contractor Acknowledgement of Receipt and Approval of Workplan (Signature and Title)	Date

STATEMENT OF WORK
Work Assignment No. 0-53

Title: Measurement of Gas Phase Pollutants from Idling Aircraft

Work Assignment COR:

John Kinsey
U. S. Environmental Protection Agency
National Risk Management Research Laboratory
NRMRL-APPCD, MD E343-02
Research Triangle Park, NC 27711
(919) 541-4121; Fax (919) 541-0359
E-mail: kinsey.john@epa.gov

Background:

The U. S. Environmental Protection Agency has entered into Cooperative Research and Development Agreement (CRADA) 596-09 with Aerodyne Research, Inc. (ARI) to conduct a study of the gas phase toxic emissions from idling aircraft under the auspices of the Airport Cooperative Research Program (ACRP). Of particular interest in the study are the emissions generated during low ambient temperatures typical of airports located in the northern portion of the U. S. Therefore, the purpose of this Work Assignment (WA) is to provide technical and testing support for research to be conducted under the CRADA with ARI.

Scope of Work:

The contractor shall provide the necessary staff and equipment needed to conduct a field study of idling aircraft at a remote location such as Midway Airport in Chicago, IL. Sampling shall be conducted over a period not to exceed 7 days in duration (plus travel to and from the test site) using EPA's Diesel Emissions Aerosol Laboratory (DEAL). The specific measurements to be made and associated sampling locations are shown in Table 1. The contractor shall prepare all instruments and samplers for use in the field campaign including all needed repair, maintenance, and calibration. In addition, the contractor shall also provide any supplementary equipment needed to provide the sample gas stream at the proper temperature and pressure to the various samplers and analyzers. The sampling probes and heated lines from the engine exhaust to the DEAL will be provided by ARI as part of the CRADA.

Table 1. Tentative Measurement Matrix

Sampling Location	Experimental Parameter	Measurement Technique	Type of Sample Collection	Instrument(s)/Sampling Media
Engine exit plane	Carbon monoxide	Nondispersive infrared	Continuous	California Analytical Model 300 (low concentration)
		Nondispersive infrared	Continuous	Horiba Model AIA-210 (high concentration)
	Carbon dioxide (CO_2)	Nondispersive infrared	Continuous	Horiba Model AIA-210
	Oxygen (O_2)[a]	Magneto-pneumatic	Continuous	Horiba Model MPA-220
	Total hydrocarbons (THC)	Heated flame ionization	Continuous	Horiba Model FIA-236
	Trace aromatics and selected polycyclic aromatic hydrocarbons[b]	Laser ionization time-of-flight mass spectrometry	Continuous	Resonance-enhanced multiphoton ionization (REMPI) mass spectrometer
	Speciated non-methane volatile organic compounds/air toxics[c]	EPA Methods TO-15 & CB-4	Time-integrated by power condition	SUMMA polished canisters
	Speciated carbonyls[d]	EPA Method TO-11a	Time-integrated by power condition	2,4 dinitrophenylhydrazine (DNPH) impregnated silica gel cartridges
Advected plume[e]	Carbon dioxide (CO_2)	Nondispersive infrared	Continuous	Horiba Model VA-3000
	Trace aromatics and selected polycyclic aromatic hydrocarbons[b]	Laser ionization time-of-flight mass spectrometry	Continuous	Resonance-enhanced multiphoton ionization (REMPI) mass spectrometer

[a] Optional
[b] Including benzene, ethylbenzene, and naphthalene.
[c] Including 1,3 butadiene, benzene, ethylbenzene, and acrolein. Ten samples maximum.
[d] Including formaldehyde, acetaldehyde and glyoxal. Thirty DNPH cartridges maximum.
[e] End-of-runway sampling to be conducted only if possible.

Upon completion of the field sampling campaign, the contractor shall conduct all needed analyses to convert the raw data to applicable fuel specific emission indices in terms of mass of pollutant/unit mass of fuel burned, including all chemical species determined. The calculations shall be conducted using a carbon balance of the gas phase pollutants measured. The contractor shall also provide the reduced data in the form of tables and graphs suitable for inclusion in the final study report to be prepared under WA 0-2.

Finally, in addition to the above, the contractor shall also provide any needed input to the preparation of the Quality Assurance Project Plan (QAPP) currently being prepared under WA 0-2. This input may include suitable text and tables needed to complete pre-test preparations, implementation of the measurement protocol, and reduction of the experimental data. In addition, the contractor shall also support the WA-COR in development of a suitable on-site field activity safety plan as required by EPA policy.

Quality Assurance:

The contractor shall develop quality assurance documentation as required in Appendix 1 to this Statement of Work. Work involving environmental data shall not commence until the quality assurance documentation has received official approval from the EPA Quality Assurance Staff. QA Category III, Measurement Project.

ATTACHMENT #1 TO THE STATEMENT OF WORK (SOW)

NRMRL Quality Assurance (QA) Requirements

In accordance with EPA Order 5360.1 A2, conformance to ANSI/ASQC E4 must be demonstrated by submitting the quality documentation specified herein. All quality documentation shall be submitted to the Government for review. The Government will review and return the quality documentation, with comments, and indicate approval or disapproval. If the quality documentation is not approved, it must be revised to address all comments and shall be resubmitted to the Government for approval. Work involving environmental data collection, generation, use, or reporting shall not commence until the Government has approved the quality documentation. The quality documentation shall be submitted to the Government at least thirty (30) days prior to the beginning of any environmental data gathering or generation activity in order to allow sufficient time for review and revisions to be completed. After the Government has approved the quality documentation, the Contractor shall also implement it as written and approved by the Government. Any EPA-funded project/program may be subject to a QA audit.

TO BE SUBMITTED PRE-AWARD:

☐ **NRMRL's Quality System Specifications:**

(1) a description of the organization's Quality System (QS) and information regarding how this QS is documented, communicated and implemented;
(2) an organizational chart showing the position of the QA function;
(3) delineation of the authority and responsibilities of the QA function;
(4) the background and experience of the QA personnel who will be assigned to the project; and
(5) the organization's general approach for accomplishing the QA specifications in the SOW.

☐ **Quality Management Plan:** prepared in accordance with R-2 - EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001, http://www.epa.gov/quality/qs-docs/r2-final.pdf

TO BE SUBMITTED POST-AWARD (mark all that apply):

☐ **NRMRL's Quality System Specifications:**
(1) a description of the organization's Quality System (QS) and information regarding how this QS is documented, communicated and implemented;
(2) an organizational chart showing the position of the QA function; 07/14/08 A-2
(3) delineation of the authority and responsibilities of the QA function;
(4) the background and experience of the QA personnel who will be assigned to the project; and
(5) the organization's general approach for accomplishing the QA specifications in the SOW.

☐ **Quality Management Plan:** prepared in accordance with R-2 - EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001, http://www.epa.gov/quality/qs-docs/r2-final.pdf

☐ **Category I or II Quality Assurance Project Plan (QAPP):** prepared in accordance with R-5 - EPA Requirements for QA Project Plans (EPA/240/B-01/003) March, 2001 http://www.epa.gov/quality/qs-docs/r5-final.pdf

X **Category III or IV QAPP:** prepared in accordance with applicable sections of the following NRMRL QAPP Requirements List(s) which is(are) included in this attachment:

X **QAPP Requirements for Measurement Projects**

☐ **QAPP Requirements for Secondary Data Projects**

☐ **QAPP Requirements for Research Model Development and/or Application Projects**

☐ **QAPP Requirements for Software Development Projects**

☐ **QAPP Requirements for Method Development Projects**

☐ **QAPP Requirements for Design, Construction, and/or Operation of Environmental Technology Projects**

ADDITIONAL QA RESOURCES:

EPA's Quality System Website: http://www.epa.gov/quality/
EPA's Requirements and Guidance Documents:
http://www.epa.gov/quality/qa_docs.html

NRMRL QAPP REQUIREMENTS FOR MEASUREMENT PROJECTS

GENERAL REQUIREMENTS:

Include cover page, distribution list, approvals, and page numbers.

0. COVER PAGE

Include the Division/Branch, project title, revision number, EPA technical lead, QA category, organization responsible for QAPP preparation, and date.

1. PROJECT DESCRIPTION AND OBJECTIVES

1.1 Describe the process and/or environmental system to be evaluated.
1.2 State the purpose of the project and list specific project objective(s).

2. ORGANIZATION AND RESPONSIBILITIES

2.1 Identify all project personnel, including QA, and related responsibilities for each participating organization, as well as their relationship to other project participants.
2.2 Include a project schedule that includes key milestones.

3. SCIENTIFIC APPROACH

3.1 Describe the sampling and/or experimental design that will be used to generate the data needed to evaluate the projective objective(s). A description of the design should include the types and numbers of samples (including QC and reserve samples), the design of the sampling network, sample locations and frequencies, and the rationale for the design.
3.2 Identify the process measurements (e.g., flow rate, temperature) and specific target analyte(s) for each sample type.
3.3 Describe the general approach and the test conditions for each experimental phase.

4. SAMPLING PROCEDURES

4.1 Describe any known site-specific factors that may affect sampling procedures as well as all site preparation (e.g., sampling device installation, sampling port modifications, achievement of steady-state) needed prior to sampling.
4.2 Describe or reference each sampling procedure (including a list of equipment needed and the calibration of this equipment as appropriate) to be used. Include procedures for homogenizing, compositing, or splitting of samples, as applicable.
4.3 Provide a list of sample containers, sample quantities to be collected, and the sample amount required for each analysis, including QC sample analysis.
4.4 Specify sample preservation requirements (e.g., refrigeration, acidification, etc.) and holding times.
4.5 Describe the method for uniquely numbering each sample.
4.6 Describe procedures for packing and shipping samples, including procedures to avoid cross-contamination, and provisions for maintaining chain-of-custody (e.g., custody seals and records), as applicable.

5 MEASUREMENT PROCEDURES

5.1 Describe in detail or reference each process measurement or analytical method to be used. If applicable, identify modifications to EPA-approved or similarly validated methods.
5.2 If not provided in Section 5.1 or the referenced method, include specific calibration procedures, including linearity checks and initial and continuing calibration checks.

6 QUALITY METRICS (QA/QC CHECKS)

6.1 For each process measurement and analytical method, identify the required QC checks (e.g., blanks, control samples, duplicates, matrix spikes, surrogates), the frequencies for performing these checks, associated acceptance criteria, and corrective actions to be performed if acceptance criteria are not met.

6.2 Any additional project-specific QA objectives (e.g., completeness, mass balance) shall be presented, including acceptance criteria.

7 DATA ANALYSIS, INTERPRETATION, AND MANAGEMENT

7.1 Identify the data reporting requirements, including data reduction procedures specific to the project and applicable calculations and equations.

7.2 Describe data validation procedures used to ensure the reporting of accurate project data.

7.3 Describe how the data will be summarized or analyzed (e.g., qualitative analysis, descriptive or inferential statistics) to meet the project objective(s).

7.3.1 If descriptive statistics are proposed, state what tables, plots, and/or statistics (e.g., mean, median, standard error, minimum and maximum values) will be used to summarize the data.

7.3.2 If an inferential method is proposed, indicate whether the method will be a hypothesis test, confidence interval, or confidence limit and describe how the method will be performed.

7.4 Describe data storage requirements for both hard copy and electronic data.

8 REPORTING

8.1 List and describe the deliverables expected from each project participant responsible for field and/or analytical activities.

8.2 Specify the expected final product(s) that will be prepared for the project (e.g., journal article, final report).

9. REFERENCES

Provide references either in the body of the text as footnotes or in a separate section.